Brownfield Cleanup for EPA Region 4 Grant Activities

Cleanup Action Activities for Grief Facility, Cullman, Alabama

Final Report

Prepared for:

THE CITY OF CULLMAN

and

ENVIRONMENTAL PROTECTION AGENCY REGION 4
BROWNFIELDS PROGRAM
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Abstract: This Final Report documents the results of cleanup activities at the Greif Brothers Facility in Cullman Alabama and includes the results of the final sampling and analysis methods to be used at the site in accordance with the approved QAPP. The sampling and analyses were performed to determine the results of remediation of chlorinated solvent contamination of soil and ground-water. The remediation activities consisted of in-situ blending of contaminated soil with sodium persulfate enhanced with lime activation, and the use of phyto-remediation in areas of moderate to low concentrations. A UIC permit for the in-situ treatment was obtained from the Alabama Department of Environmental Management. Polishing of the remaining contaminants is being accomplished with phyto-remediation and low-vacuum (micro-blower attached to well) removal of vapors in the vadose zone.

To allow access to the area needed for treatment, the structure housing the Sanitation/Street Department, AOC 2, was partially demolished and the slab was removed (by the City of Cullman under contract with Solid Rock Demolition). After the chemical oxidation treatment was completed, soil samples were collected at four locations. Sample locations are designated in Figure 1. These samples were analyzed for VOC's and RCRA 8 metals. The analyses for VOC's indicates that the chlorinated contaminant concentrations meet the target cleanup goals for tetrachloroethylene, trichloroethylene, dichloroethylene, vinyl chloride, benzene and toluene for almost all parameters in the soil samples at all the depths sampled. The only constituent that failed to meet the target soil cleanup level was trichloroethene in sample PA2-S1B, at .082 ppm which is greater than the goal of .06 ppm. Continued reduction of the concentration of trichloroethene is anticipated to result from natural degradation processes. A vapor extraction system near the building will ensure any residual concentrations under the building slab will be reduced.

Significant reduction in soil concentrations in this area appear to indicate that the chemical oxidation treatment was very effective. During the soil treatment process, GMC environmental professionals oversaw the soil blending and addition of sodium persulfate into the zone of contamination by ExoTech, Inc. Photoionization detectors were used to identify soils with elevated VOC concentrations so that the appropriate treatment was targeted to the appropriate locations.

Sampling and analyses of monitoring wells in AOC 2 was conducted to determine the improvement in groundwater quality as a result of cleanup activities. The results of analyses of groundwater helped document the impact of continued natural degradation on contaminant concentrations at MW 4. The results of analyses are documented in Appendix A. All volatile organic compound concentrations are compared to remedial goals established by the Alabama Department of Environmental Management for cleanup of the Voluntary Cleanup Program project at Greif Brothers. These goals are listed in Table 1.

Remedial efforts at AOC 3 were enhanced by phyo-remediation plots and by the installation of a vapor extraction system. The vapor extraction system will remove VOCs in the form of vadose zone gases originating from underlying contaminants.

Soil sampling and analyses conducted in AOC3 near the phyto-remediation plot have documented reductions in VOC concentrations as a result of the remedial actions. The results of analyses of soil samples from AOC3 are included in Appendix A.

A1. Problem Definition/Background

The Grief Brothers Facility is located within the City of Cullman, Alabama in Cullman County (Figure 1). Cullman County is located in north-central Alabama. The footprint of the facility (Figure 2) is plotted on the U.S.G.S. Cullman, Alabama 7.5-minute topographic map. The Greif Facility manufactured steel containers and drums in the City of Cullman for almost 88 years. The location was also the site of a King Pharr canning plant. The facility ceased operations in 2001. The facility consisted of several former manufacturing buildings and warehouses constructed using steel girder framework and sheet metal walls. Most of the original buildings have been demolished to allow better access for remedial activity. A major portion of this demolition was completed during Phase I of the cleanup of this site under the State Revolving Loan Fund Activity. A new City of Cullman police department and vehicle maintenance shop have been added to the facility during the past two years. The state of repair varies in the two older buildings, but the buildings are structurally sound. Remediation and reuse of the site was begun in 2009 as part of the Alabama Department of Environmental Management's Brownfield Voluntary Cleanup Program.

Previous industrial activity during the 88 year active history of the site resulted in the release of chlorinated solvents, paints, petroleum products, and heavy metals at the Greif Brothers Facility. Previous analyses of samples of soil, ground water, and passive soil gasses from beneath the facility indicate that releases occurred and remediation was required. Multiple Areas-of-Concern (AOC) were previously identified (Figure 3), and prioritized for remediation. Area-of-Concern Number 1 was treated from December 2011 through February 2012 using in-situ blending of sodium persulfate with lime activation. Polishing of the remaining contaminants is being accomplished with phyto-remediation and low-vacuum removal (micro-blower attached to well) of vapors in soil vadose zone. The process of phyto remediation was first initiated in 2009.

A2. Project/Task Description

The City of Cullman worked with State environmental officials to identify the concerns at the site and to map a plan for cleanup. The Alabama Department of Environmental Management (ADEM) Brownfield program approved the site cleanup plan and assisted Cullman in obtaining money for cleanup through the revolving loan fund. The program fees for oversight were paid previously by the City of Cullman. UIC Injection Permit fees for a portion of this project were previously paid by the City of Cullman and this treatment was authorized by ADEM.

During 2013 and 2014, the remedial goals were pursued in AOCs 2 and 3, incorporating natural cleanup options like phyto-remediation in combination with chemical treatment and vapor extraction to aid in the rehabilitation of the facility.

The data collection consisted of obtaining representative soil and ground-water samples to define current site conditions post treatment in the areas of remediation and to determine the cleanup effectiveness. Testing of AOC 2 focuses on post concentrations of VOC's and PAH's at surficial and deeper locations up to 10-feet below ground surface. Post treatment soil and

ground-water samples were collected and analyzed to determine the effectiveness of cleanup efforts and are compared to ADEM VCP cleanup levels. These data are included in Appendix A. The final BaP TEQ in Table 4 have been calculated and compared to EPA criteria from a recent EPA cleanup in Jefferson County.

A3. Sampling Objectives of the Project

The sampling objectives of the project documented within the final QAPP are twofold: (1) to obtain representative soil and ground-water samples for chemical analyses; and (2) to document the effectiveness of the remedial treatment at AOC # 2 with those analyses as well as compare the results of enhanced activities in AOC 3 to remedial goals.

Action Levels and chemicals of concern

The Corrective Action Levels for Constituents of Concern were approved by the Alabama Department of Environmental Management under the Voluntary Cleanup Program as the Greif Brothers Cleanup and Assessment Plan. The constituents of concern and their respective screening/corrective action levels are listed in Table 1 as follows.

Table 1. Constituents-of-Concern and ADEM determined Screening/Corrective Action Limits

	Screening/Corrective Action Levels*	
TAL Metals	**Soil (mg/Kg)**	**Water (mg/L)**
Aluminum	100,000	0.05 to 0.2
Antimony	5.0	0.006
Arsenic	11.1	0.01
Barium	1,600	2.0
Beryllium	63.0	N
Cadmium	8.0	0.005
Calcium	N	N
Chromium (Total)	38.0	0.1
Cobalt	100,000	0.3
Copper	75,908	1.3
Iron	100,000	0.3
Lead	400	0.015
Magnesium	N	N
Manganese	32,250	0.05
Mercury	613	0.002
Nickel	130	N
Potassium	N	N
Selenium	5.0	0.05
Silver	34.0	0.1
Sodium	N	N
Thallium	135	0.002
Vanadium	6,000	N
Zinc	120,000	0.18

*ADEM VCP Site Specific target Levels for Grief facility, Cullman, Alabama, 2009

Table 1. Constituents-of-Concern and ADEM determined Corrective Action Limits		
	*Corrective/Screening Levels	
TPH (8015B)	**Soil (mg/Kg)**	**Water (mg/L)**
TPH (gasoline range)	100	N
TPH (diesel range)	100	N
SVOC's (8270C)		
Isophorone	0.5	70.77
2-Methylnaphthalene	N	N
2-Methyphenol	15.0	1,825
Naphthalene	84.0	20.0
Fluoranthene	101	0.206
Bis(2-ethylhexyl)phthalate	180	4.8
VOC's (8260B)		
Benzene	0.03	0.005
2-Butanone	N	N
Carbon Disulfide	32.0	N
Chloroethane	6.5	N
1,1-Dichloroethane	23.0	N
1,2-Dichloroethane	0.02	0.005
1,1-Dichloroethene	0.06	0.007
Cis-1,2-dichloroethene	0.4	0.07
Trans-1,2-dichloroethene	0.7	0.10
Ethylbenzene	13.0	0.70
4-Methyl-2-Pentanone	N	N
Tetrachloroethene	0.06	0.005
Toluene	12.0	1
1,1,1-Trichloroethane	2.0	0.20
Trichloroethene	0.06	0.005
Vinyl Chloride	0.01	0.002
Xylenes (total)	210	10
*ADEM VCP Site Specific target Levels for Grief facility, Cullman, Alabama, 2009		

B. Sampling Description

B1. Plan overview

This sampling plan was designed to provide the data necessary for Region 4 Environmental Protection Agency (EPA) to determine the effectiveness of the selected remedial treatment. To achieve the project objectives, approximately 12 soil samples and 7 ground-water samples were collected and analyzed for selected chemicals-of-concern. Analytical results of samples collected after the cleanup was completed are compared to annual pre-cleanup test results to determine

the effectiveness of the selected remedial action. The analytical data gathered provide EPA and ADEM with sufficient information to determine whether the cleanup has achieved its remedial goals for the area treated. The quality assurance/quality control (QA/QC) including field blanks indicated contaminants were not introduced during the field exercise. The background sample collected from Sportsman Park contained no PAH's. It did contain traces of methylene chloride and chloromethane.

B2. Quality Objectives and Criteria

Detailed performance measures

The primary objective of sampling and analyses was to document the effectiveness of the remedial treatment in achieving reduction in concentrations for selected chemicals-of-concern in soil and ground-water beneath Area-of-Concern Number 2 and Area-of-Concern Number 3 at the former Grief Brothers Facility in Cullman, Alabama. The performance of the remedial technique is evaluated in the attached figures and is determined by measuring the reduction in concentration for the selected chemicals-of-concern listed in Table 1 or by determining if established cleanup goals were met. Ground-water samples were collected from existing monitoring wells (Figure 4) to allow comparisons to historical data.

VOC's and PAH's

Prior and current concentrations were characterized and quantified as (1) concentration by chemical, (2) sum of concentrations of PAH compounds where appropriate, and (3) percent change in concentration of selected chemical of concern.

B3. Sampling Methods

The methodology utilized to collect soil and water samples was consistent with the guidelines set forth in the Alabama Environmental Investigation and Remediation Guidance document prepared by the ADEM (September 2005).

Ground-water samples were collected after three well volumes of water were purged. Wells 1, 2, 3, 4R, 6, 9 and 10 were sampled. Measurements of pH, specific conductance, dissolved oxygen, and temperature were recorded after the purge process. Samples were collected with disposable bailers.

Preparation of sample collection instruments

All reusable sample collection instruments were decontaminated prior to use and between sample collection. GMC utilized hand augers for soil sample collection. New, disposable, pre-cleaned bailers were utilized to collect groundwater samples. Samples were placed in laboratory- provided and preserved containers and placed in a cooler on ice. Sample containers were obtained from Sutherland Environmental Laboratory to ensure contaminant-free containers.

B4. Sample Handling and Custody

All samples were labeled in the field with a unique sample identification, project number, samplers' initials, date, time, and analyses requested. Samples were placed in a cooler, on ice, and proper chain-of-custody was maintained until delivery to Sutherland Environmental Services a certified laboratory in Birmingham, Alabama. All samples were collected in a manner proscribed by the ADEM FOP Manual. This manual requires that all samples were handled with clean sample collection equipment and with personnel utilizing fresh nitrile gloves for each sample in such a way as to minimize any potential for cross contamination.

B5. Analytical Methods

U.S. EPA approved analytical methods were used by contract laboratories to process soil and water samples.

VOC	SW846 Method 8260
Metals	SW846 3010/3020/7000/6010B
PAH	SW846 Method 8100/8270C

Quality Assurance and Usability The data collected during this field activity passed quality assurance checks and was determined to meet usability considerations.

B6. Instrument/Equipment testing, inspection, and maintenance

Instruments were inspected and calibrated daily. Instruments that failed calibration tests were replaced. Rented instruments were calibrated before shipment by the manufacturer/supplier.

C1. Results

In the area of AOC 2, in-situ chemical oxidation was conducted to reduce soil concentrations. In the PA2 samples in Priority Area 2, all constituents met the cleanup goal except for one sample; PA2-S1B, the sample collected at depth at this location, which exceeded the corrective action concentration goal by .022 mg/Kg for trichloroethene (Table 2).

Table 2. Results of analyses of soil samples at Grief Facility, Cullman, Alabama								
Constituent:	Soils ppm (mg/Kg)							
Date- 9/24/14	CAL (mg/L)	PA2-S1A	PA2-S1B	PA2-S2A	PA2-S2B	PA2-S2D		
1,1-Dichloroethene	0.06	BDL	0.012	BDL	BDL	BDL		
cis-1,2-Dichloroethene	0.4	0.065	0.260	0.125	0.009	.009		
Trichloroethylene	0.06	0.022	0.082	0.057	BDL	BDL		
Tetrachloethene	0.06	BDL	BDL<.005	0.016	0.011	BDL		
Vinyl Chloride	0.01	BDL	0.006	BDL	BDL	BDL		
Arsenic	11.1	7.2	2.0	6.3	BDL	2.8		
Lead	400	12	14	14	11	9.9		
NA	Not analyzed for							
CAL	*ADEM VCP Site Specific target Levels for Grief facility, Cullman, Alabama							

Table 2. Results of analyses of soil samples at Grief Facility. Cullman, Alabama								
Constituents:	Soils ppm (mg/Kg)							
Date- 9/24/14	CAL (mg/L)	PA2-S3A	PA2-S4A	PA2-S4B	PA3-S1	PA3-S2		
1,1-Dichloroethene	0.06	BDL	BDL	BDL	BDL	BDL		
cis-1,2-Dichloroethene	0.4	BDL	BDL	BDL	BDL	BDL		
Trichloroethylene	0.06	BDL	BDL	BDL	BDL	BDL		
Tetrachloethene	0.06	BDL	BDL<.005	BDL	BDL	BDL		
Vinyl Chloride	0.01	BDL<0.005	BDL	BDL	BDL	BDL		
Arsenic	11.1	7.2	2.0	6.3	NA	NA		
Lead	400	12	14	14	NA	NA		
NA	Not analyzed for							
CAL	*ADEM VCP Site Specific target Levels for Grief facility, Cullman, Alabama, 2009							

Enhanced natural degradation at the site over time should achieve the corrective action goal. The metals concentrations for arsenic and lead met the cleanup goals.

In Priority Area 3, no volatile organic compounds were detected at concentrations above the laboratory reporting limits. It is very difficult to capture VOC's in soil samples, however earlier samples had indicated low levels of VOC's in this area. It is expected that soil gas venting and natural attenuation will continue to lower VOC concentrations in this area.

Monitoring well #6 is a valuable indicator of groundwater quality in the area of the AOC 2 where soils were treated with sodium persulfate (Table 3). Concentrations of VOC

contaminants in this area decreased by roughly an order of magnitude. Cis 1,2 dichloroethene concentrations decreased from 10.3 ppm to 1.29 ppm. This is a reduction of 87.5 %. Trichloroethylene concentrations decreased from a high of 1.06 in 2010 to 0.096 in September 2014. Most notably, vinyl chloride concentrations decreased from a high of 1.29 ppm in 2007 to .028 ppm. The degradation of tetrachloroethene and trichloroethene often stalls at vinyl chloride. It is anticipated that natural attenuation will continue to reduce the concentrations of all the VOC's. The vapor extraction system will also reduce VOC concentrations and ensure that off gassing of solvents into the adjacent building will not occur. There is little opportunity for any human exposure in these areas as most soil concentrations have met their respective goals. Additionally, due to the paving and concrete building slabs in the northern portion of the property there is little opportunity or risk for access to any contaminants.

Table 3. Results of analyses of ground-water samples at Grief Facility, Cullman, Alabama

Well No:	MW-6							
Date	CAL (mg/L)	8/14/07	1/9/09	2/11/10	3/18/11	3/29/12	8/30/12	9/25/14
Benzene	0.005	0.005	0.006	0.008	NS	<0.005	<0.005	<0.005
1,1-Dichloroethene	0.007	0.013	0.026	0.032	NS	0.017	0.009	<0.005
1,1-Dichloroethane	0.081*	NA	0.025	0.020	NS	<0.005	<0.005	<0.005
1,2-Dichloroethane	0.005	<0.005	0.007	<0.005	NS	<0.005	<0.005	0.006
cis-1,2-Dichloroethene	0.070	10.300	7.150	10.100	NS	8.000	6.610	1.290
trans-1,2-Dichloroethene	0.100	0.018	0.028	0.045	NS	0.045	<0.005	0.156
Trichloroethylene	0.005	0.780	0.815	1.060	NS	0.833	0.435	0.096
1,3,5-Trimethylbenzene	0.0012*	0.019	<0.005	<0.005	NS	<0.005	<0.005	<0.005
Vinyl Chloride	0.002	1.290	0.810	1.220	NS	1.050	0.689	0.028
Chloromethane	0.016*	NA	<0.005	NA	NS	<0.005	<0.005	0.084
Methylene Chloride	0.005*	<0.005	<0.005	<0.005	NS	<0.005	<0.005	0.020
1,1,2-Trichloroethane	0.005*	<0.005	<0.005	<0.005	NS	<0.005	<0.005	0.013
Arsenic	0.01	<0.01	<0.01	<0.01	NS	NA	NA	<0.010
Lead	0.015	<0.01	<0.002	<0.002	NS	NA	NA	0.066
NS	not sampled							
NA	not analyzed for							
CAL	Corrective action target concentration, 2009							
	*ADEM VCP Site Specific target Levels for Grief facility, Cullman, Alabama, 2009							

Monitoring well number 4 is a significant indicator of groundwater conditions in the northern portion of the Greif Brothers site. In 2007, contaminant concentrations of trichloroethene were at a historical high of 71.9 mg/l. This area was treated through in-situ chemical oxidation in 2011and 2012 and the nearby phyto-remediation plots are thought to have contributed to the continued enhanced natural degradation of contaminants in this location. After chemical

treatment, a replacement well was advanced in the same area and during this last testing, trichloroethene concentrations were reduced to less than the method detection limit. This is a 99.99 % reduction in concentration. No other volatile organic contaminants were detected in groundwater in the area.

Table 3. Results of analyses of ground-water samples at Grief Facility, Cullman, Alabama

Well No:	MW-4							
Date	CAL (mg/L)	8/14/07	1/9/09	2/11/10	3/18/11			
n-Butylbenzene	N	0.116	0.135	<0.005	0.128			
sec-Butylbenzene	0.024*	0.010	0.015	0.012	0.013			
1,1-Dichloroethene	0.00700	0.087	0.119	0.063	0.099			
1,2-Dichloroethane	0.00500	NA	0.014	<0.005	<0.005			
cis-1,2-Dichloroethene	0.07000	17.400	15.000	11.300	13.400			
trans-1,2-Dichloroethene	0.10000	0.015	0.020	0.025	0.040			
Ethylbenzene	0.70000	0.540	0.314	0.310	0.319			
Isopropylbenzene	0.66*	0.196	0.234	0.149	0.160			
4-Isopropyltoluene	N	<0.005	0.020	<0.005	0.045			
Naphthalene	20.00000	0.490	0.745	0.455	0.598			
n-Propylbenzene	N	0.625	0.382	0.380	0.310			
Tetrachlororthene	0.00500	0.052	0.061	0.050	0.067			
Toluene	1.00000	0.008	<0.005	<0.005	<0.005			
Trichloroethylene	0.00500	71.900	54.300	30.400	42.700			
1,1,1-Trichloroethane	0.20000	<0.005	0.009	<0.005	0.006			
1,2,4-Trimethylbenzene	0.0012*	1.020	3.680	2.840	1.570			
1,3,5-Trimethylbenzene	0.0012*	3.120	0.514	0.576	0.661			
Vinyl Chloride	0.002	0.810	0.429	0.412	0.699			
Xylenes, Total	10	2.330	1.500	1.180	1.070			
2-Methylnaphthalene	N	0.123	NA	NA	NA			
2-Chlorotoluene	0.012*	<0.005	0.190	<0.005	<0.005			
4-Chlorotoluene	N	<0.005	0.055	<0.005	<0.005			
Oil and Grease	N	1.000	NA	NA	NA			
Arsenic	0.01				NA			
lead	0.015				NA			
NA	not analyzed for							
CAL	*ADEM VCP Site Specific target Levels for Grief facility, Cullman, Alabama, 2009							

Table 3

Groundwater COC Summary for Detected Compounds

Monitoring Wells

Facility Name: Grief Cullman, AL

Table 3. Results of analyses of ground-water samples at Grief Facility, Cullman, Alabama								
Well No:	MW-4R							
Date	CAL (mg/L)	3/29/12	8/30/12	9/25/14				
Bromoform	0.08*	0.01200	<0.005	<0.005				
Chloromethane	0.0016*	0.17000	0.01800	<0.005				
cis-1,2-Dichloroethene	0.07000	0.25700	0.02600	<0.005				
trans-1,2-Dichloroethene	0.10000	0.04500	<0.005	<0.005				
Tetrachloroethene	0.00500	0.13800	0.01600	<0.005				
1,1,1-Trichloroethane	0.20000	0.03600	<0.005	<0.005				
Trichloroethylene	0.00500	0.89900	0.02300	<0.005				
Bromomethane	0.00087*	<0.005	0.07600	<0.005				
Arsenic	0.01	NA	NA	<0.01				
Lead	0.01500	NA	NA	0.024				
NA	not analyzed for							
CAL	*ADEM VCP Site Specific target Levels for Grief facility, Cullman, Alabama, 2009							

The results of VOC sampling and analysis for MW 1 and 2 are presented in the following tables. These wells have been sampled at various times over the last 8 years.

Monitoring/Recovery Well Concentration Data (mg/l)								
Well No:	MW-1							
Date	8/14/2007		1/9/2009	2/11/2010				9/25/2014
1,1Dichloroethane			0.01200	0.01600				0.01100
1,1Dichloroethene	0.00700		0.00800	0.01600				0.00500
cis-1,2Dichloroethene	0.12100		0.15100	0.19600				0.078000
Trichloroethylene	0.10900		0.15100	0.19700				0.06700
Vinyl Chloride	0.00500		0.00200	0.00200				0.00200
	2007	2008	2009	2010	2011	2012	2013	2014

Section 14 - Monitoring/Recovery Well Concentration Data (mg/l)								
Well No:	MW-2							
Date	8/14/2007							
cis-1,2Dichloroethene	0.02400		0.01200	0.01100				0.025
Chloroethane	0.00500		0.00600	0.00500				0.005
Vinyl Chloride	0.00500		0.00200	0.00400				0.006
	2007	2008	2009	2010	2011	2012	2013	2014

Monitoring wells # 1 and 2 are located in an area near the property line where contaminant levels have historically been significantly less than monitoring wells closer to the hot zones. In monitoring well #1, cis 1,2 dichloroethene concentrations decreased from a high of 0.151 ppm in 2009 to 0.078 ppm in September 2014. Trichloroethene concentrations fell from 0.151 in 2009 to .067 ppm . These low level concentrations could be effectively reduced through a hybrid poplar phyto plot that enhances the natural degradation process. Concentrations in monitoring well #2 iare largely unchanged.

Lead concentrations in groundwater exceed the site goals with concentrations of 0.037 ppm and 0.043 ppm for monitoring wells #1 and #2 respectively. Recent evaluations have indicated that the source or this lead is probably associated with contaminants from deposits located along the railroad rather than from the Greif Brothers site. Creosote treated cross ties, slags, and other waste materials have been observed near the railway in an area that appears to have been a dumping area.

In AOC 3 near the phyto plots, polycyclic aromatic hydrocarbons were known to be present. Historically, large storage piles of creosote railroad ties were present on the railroad side of the property up-gradient of Greif Brothers. Storm water runoff frequently brought residues from these storage areas on to the area of the phyto plots. At the time of the development of the VCP Cleanup Plan, actual cleanup goals were not established for the individual constituents recognized as these frequently encountered contaminants. One of the goals of the phyto plots was to lower concentrations of these materials and to provide breakdown of the low- level contaminants that were expected from the hazardous waste storage in the area. The individual constituent concentrations of these contaminants are provided in Appendix B. The relative total toxicity coefficient as benzo (a) pyrene (BaP TEQ) is provided in the Table 5 below:

Sample Identification	Goal	BaP TEQ	Benzo a Pyrene

CUL-SBG-1	1.5 ppmTEQ	0.12005	<. 05
PA3-S-1	1.5 ppm TEQ	0.12005	<.05
PA3-S-2	1.5 ppm TEQ	0.137368	0.067
PA3-S-3 PA3-S-4	1.5 ppm TEQ	0.722362 2.01857	0.468 1.17
PA3-S-5	1.5 ppm TEQ	1.053625	0.72
PA3-S-5D	1.5 ppm TEQ	8.0841	5.45
BaP TEQ	Benzo a pyrene toxicity coefficient		

The phyto plot in this area was established in 2012 and the hybrid poplars and cypress are well established. All the trees are achieving about 4 feet of growth per year. The hybrid poplars are typically about 12 feet tall. The BaP TEQ at PA3- S-5D (3 -4 feet below ground surface) is 8 times greater than the surface BaP TEQ at this location. As the trees mature and develop significant root mass at depth, the degradation of contaminants at depth should increase. This result suggests that the phyto plots are enhancing the degradation of these constituents. Phyto-remediation is a relatively time consuming approach that requires the development of extensive root systems into the soils and extended time frames for the slow breakdown of contaminants.

C1. Conclusions

Results from a final round of testing conducted in September 2014 indicated all of the cleanup goals for the soils in a major hot spot in AOC 2 had been met except one for trichloroethene, which was .02 parts per million above its goal. However, because of the sustainable nature of the remedial strategies implemented, the enhanced natural degradation of contaminants will continue, thus achieving the goal in the near future. This indicates that the in-situ chemical oxidation remediation was successful in meeting the objective of the cleanup. Groundwater concentrations in this area, while decreasing, did not meet the goals for all wells. However, the natural degradation processes and enhanced reductions through phyto-remediation and soil vapor extraction will continue to reduce these contaminant levels.

The enhanced natural attenuation was demonstrated at MW 4 and MW4R where concentrations continued to decrease. More than two years have passed since the initial chemical oxidation treatment in the area surrounding Monitoring Well 4 (MW 4), located near a phyto-remediation plot established to treat one of the major AOCs. Recent test results indicate the concentration of contaminants has continued to steadily decrease and are below the detection limits of .005 parts per million in the groundwater for all the chlorinated solvents targeted.

The potential for exposure has been greatly reduced. Most areas are either capped by graveled parking or building slabs. Surficial PAH concentrations in the southern phyto plot appear to be falling.

The goal of this project was to improve site conditions such that the Greif Brothers property could be cleaned up and readied for reuse. In our grant application, we set the goal of utilizing several processes that included green technologies to accomplish the cleanup of the site. Our goal was to achieve a successful cleanup that would allow 90% of the property to be ready for reuse. The cleanup has met this goal and the green technologies utilized will continue to improve site conditions in areas in need of additional reductions.

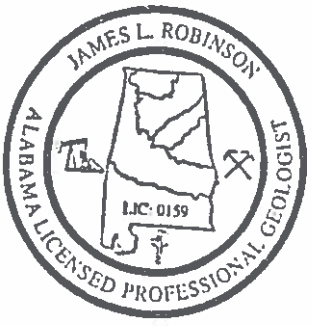
I certify under penalty of law that I have personally examined and am familiar with the information submitted with this report and all attachments. I believe that all information contained herein is true, complete and accurate.

Signed

Jymalyn E. Redmond

Signed

James Robinson



FIGURES

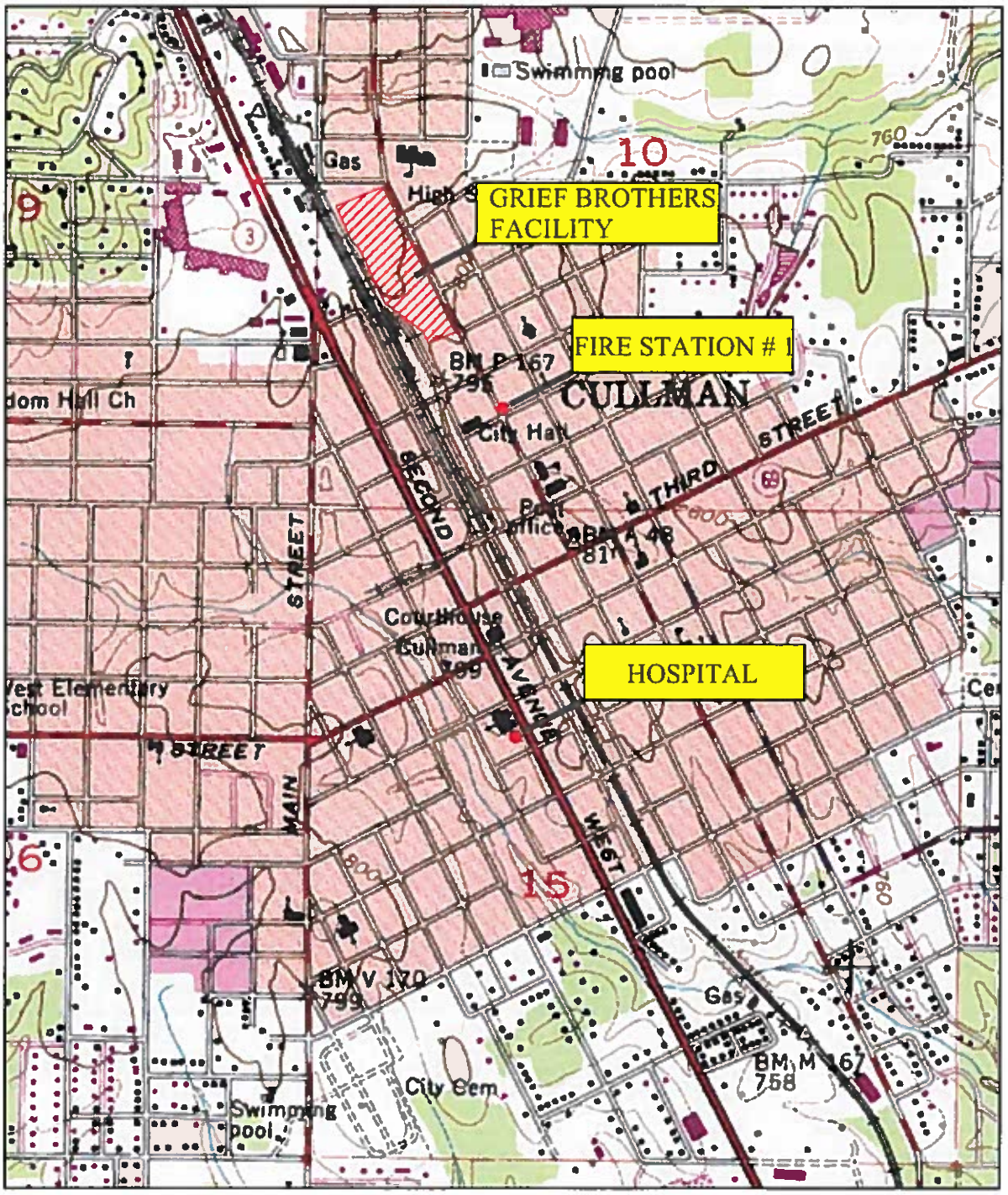
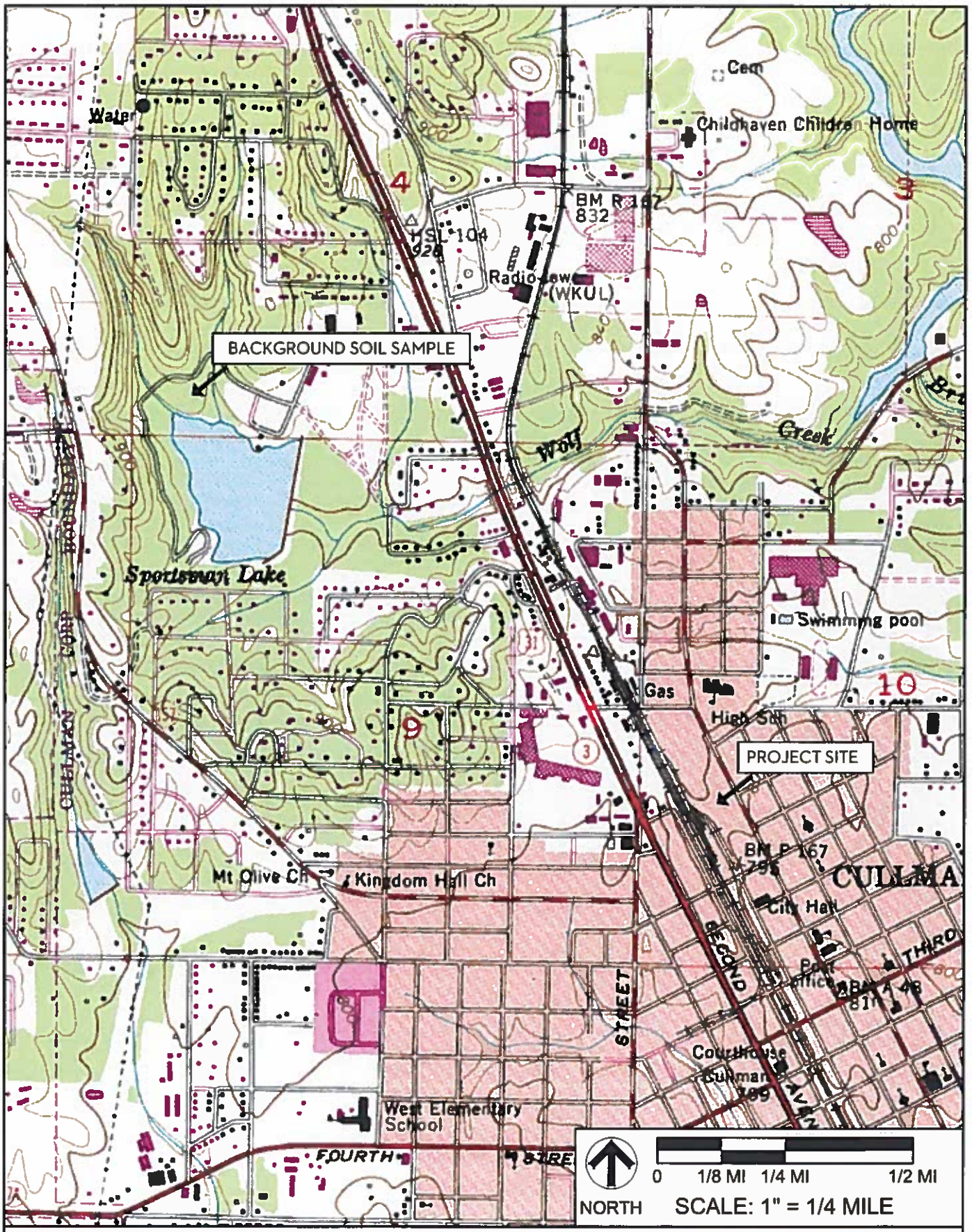


FIGURE 1

Goodwyn, Mills & Cawood, Inc. P. O. Box 242128 2660 East Chase Lane, Suite 200 Montgomery, Alabama 36124	**TITLE:** Location of Grief Brothers Facility, Cullman, AL	**DESIGNED:**
		DRAWN: JLR
	PROJECT: Grief Brothers Facility Brownsfield Remediation	**SCALE:** NTS
		DATE: 10/13



REF. SHEET: USGS QUADRANGLE, CULLMAN, AL
DESCRIPTION: OVERVIEW PROJECT MAP

CULLMAN CLOSE OUT

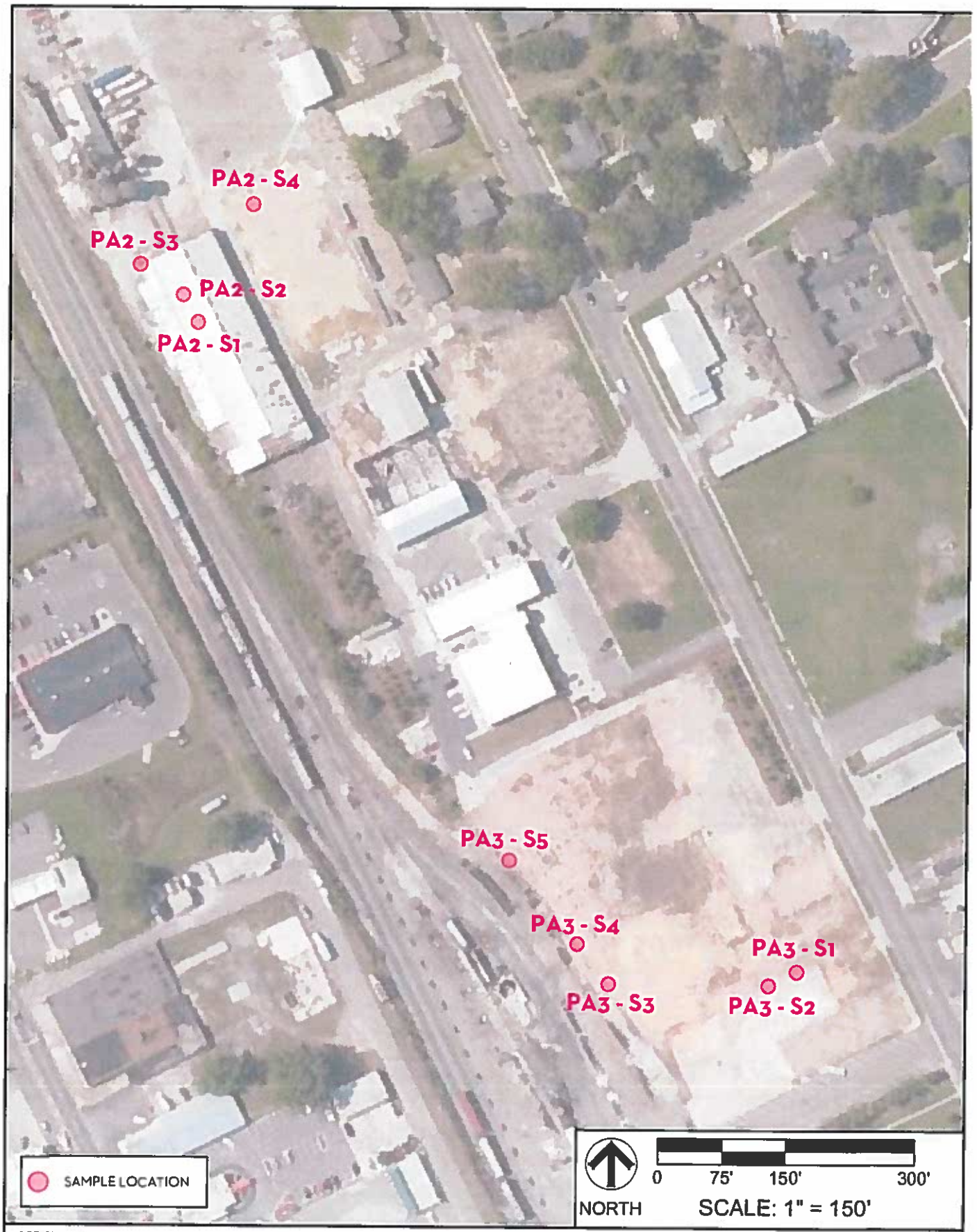
CULLMAN, ALABAMA

FIGURE 2

USGS QUADRANGLE MAP
GMC #
DATE: 10/30/2014
DRAWN BY: JDE

GOODWYN | MILLS | CAWOOD

2660 EastChase Lane, Suite 200 | Montgomery, AL 36117
Tel 334.271.3200 | GMCNETWORK.COM



REF. SHEET: ESRI WORLD IMAGERY
DESCRIPTION: SOIL SAMPLES

CULLMAN CLOSE OUT

CULLMAN, ALABAMA

FIGURE 3

AERIAL PHOTOGRAPH
GMC #
DATE: 10/30/2014
DRAWN BY: JDE

GOODWYN | MILLS | CAWOOD

2660 EastChase Lane, Suite 200 | Montgomery, AL 36117
Tel 334.271.3200 | GMCNETWORK.COM

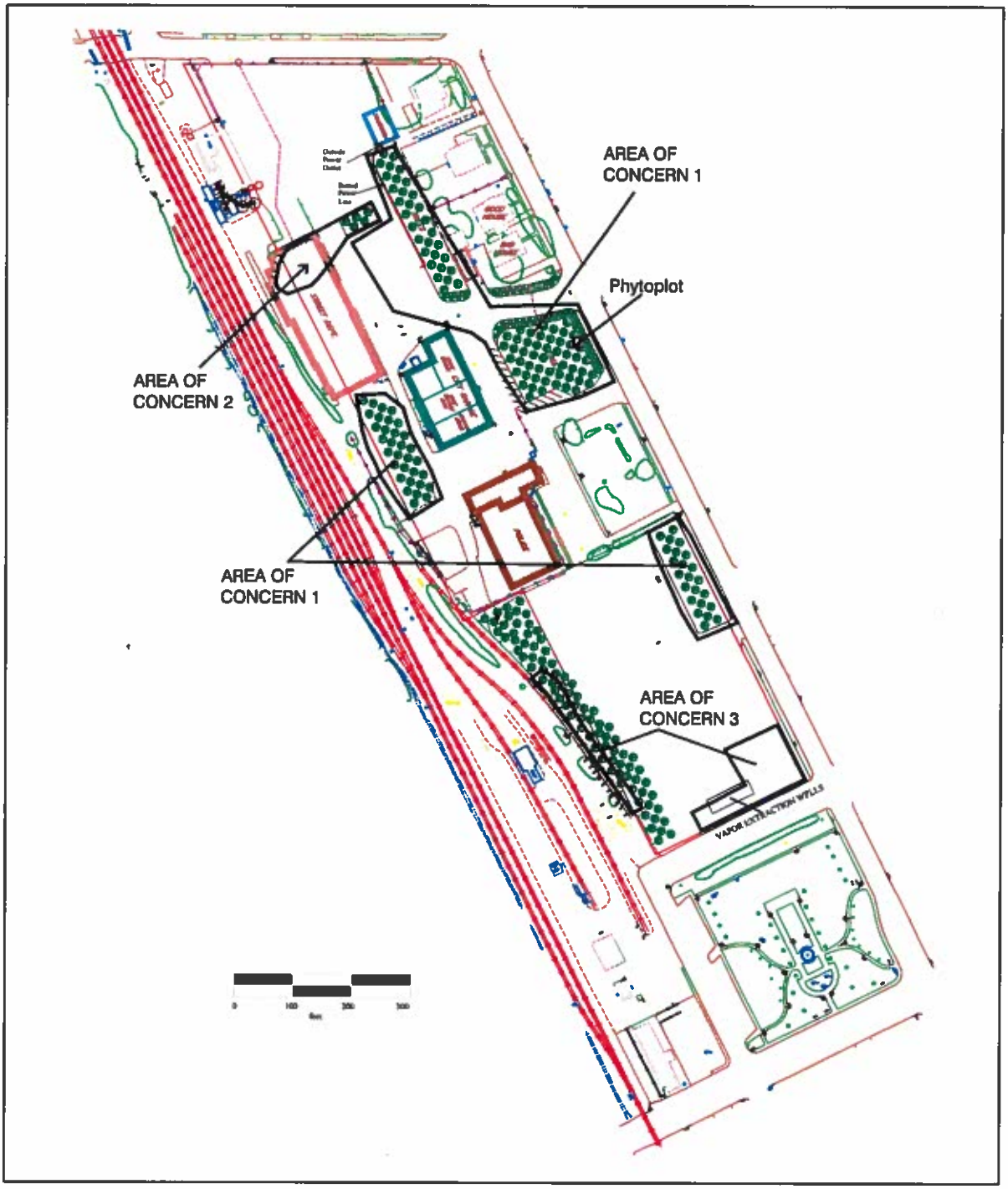


FIGURE
4

Goodwyn, Mills & Cawood, Inc.

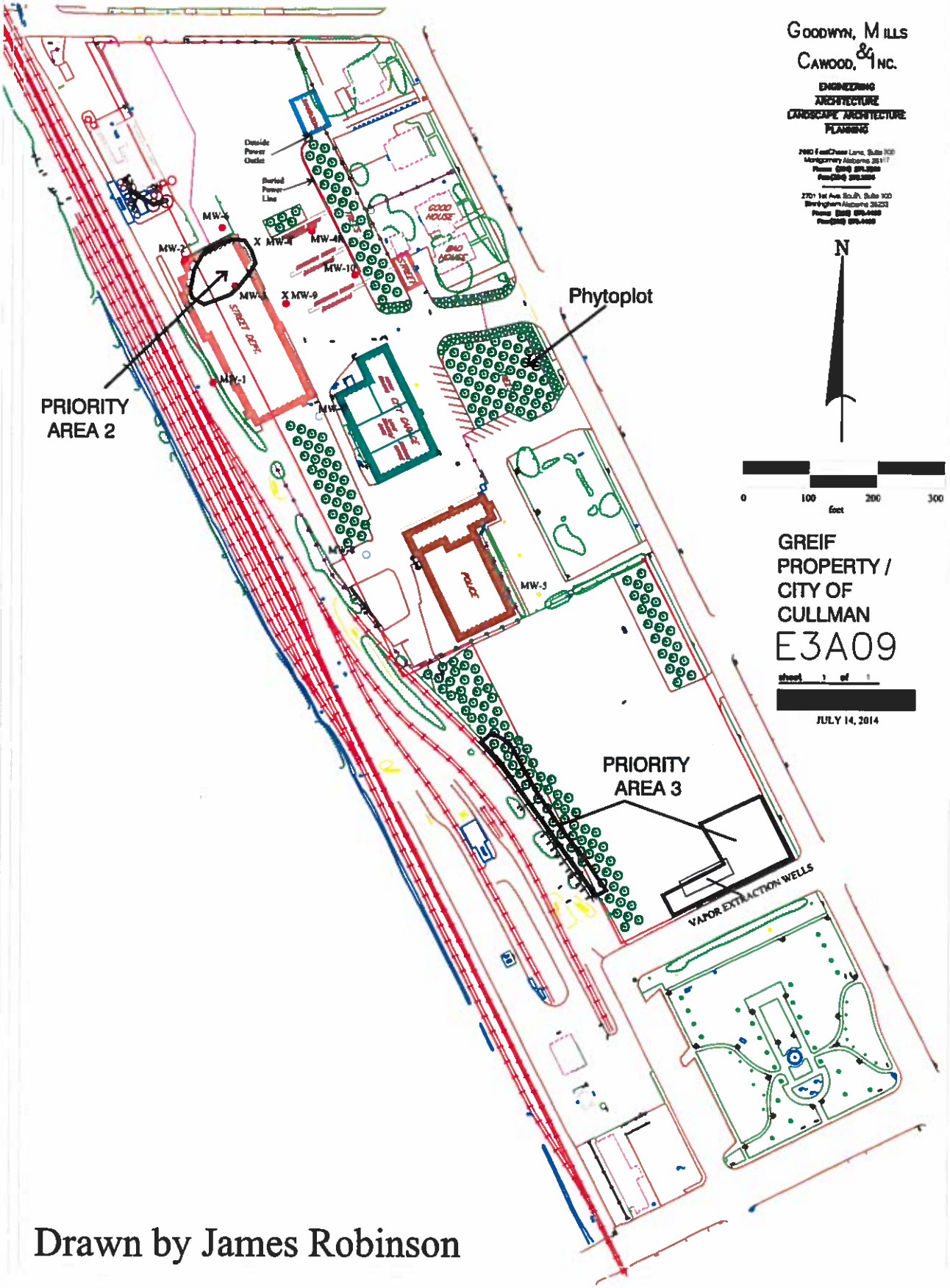
P. O. Box 242128
2660 East Chase Lane, Suite 200
Montgomery, Alabama 36117

TITLE: Areas-of-Concern Cullman, AL	**DESIGNED:**
	DRAWN: JLR
PROJECT: Former Grief Facility Brownsfield Remediation	**SCALE:** As Shown
	DATE: 10/13

FIGURE
5

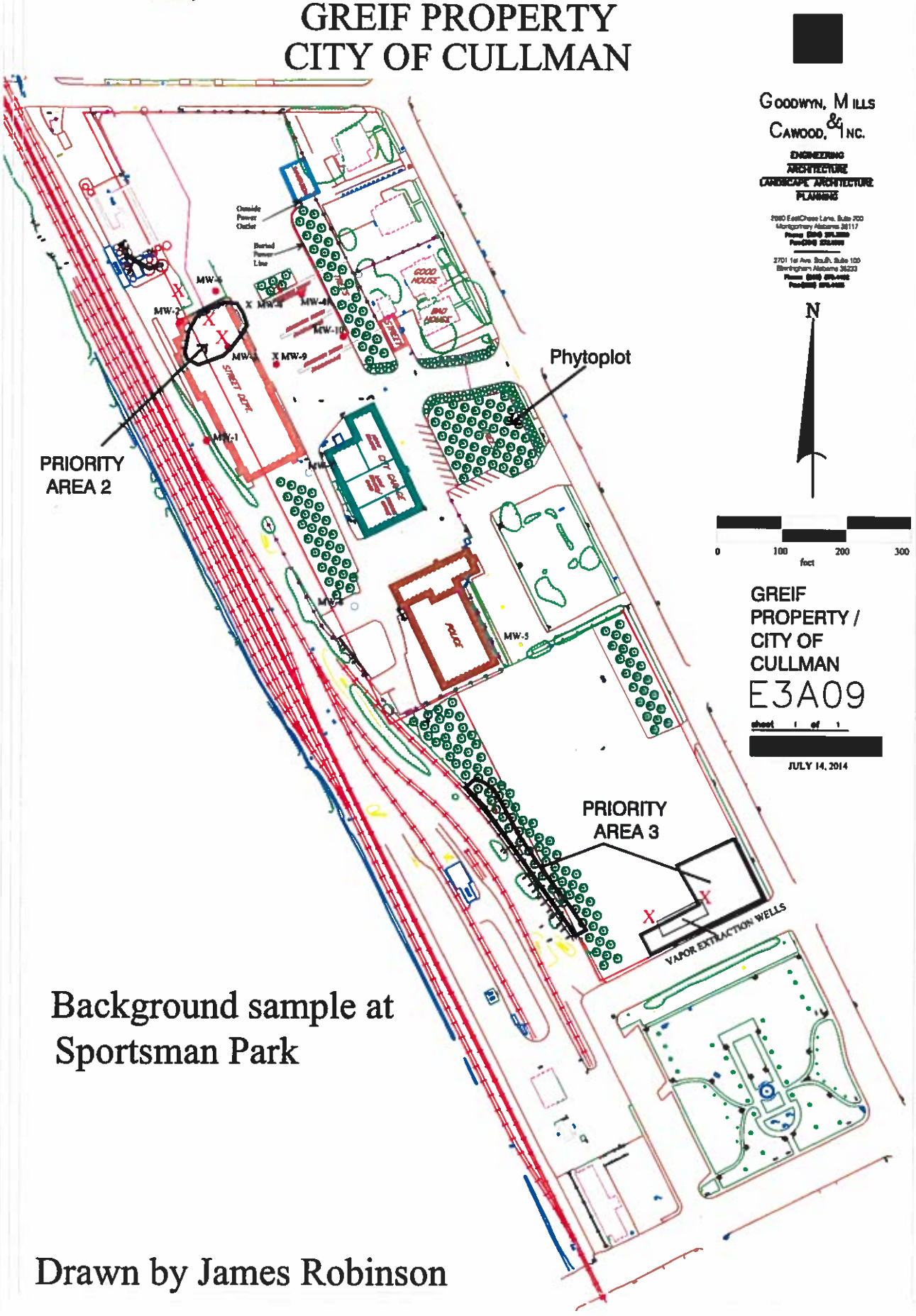
Goodwyn, Mills & Cawood, Inc. P. O. Box 242128 2660 East Chase Lane, Suite 200 Montgomery, Alabama 36117	**TITLE:** Monitoring wells, ground–water surface, and direction of flow	**DESIGNED:**
		DRAWN: JLR
	PROJECT: Former Grief Facility Brownsfield Remediation	**SCALE:** As Shown
		DATE: 10/13

Figure 6
Summer 2014 ground-water sampling points in red
GREIF PROPERTY
CITY OF CULLMAN



Drawn by James Robinson

FIGURE 7
X ,SUMMER 2014 SOIL SAMPLES
GREIF PROPERTY
CITY OF CULLMAN

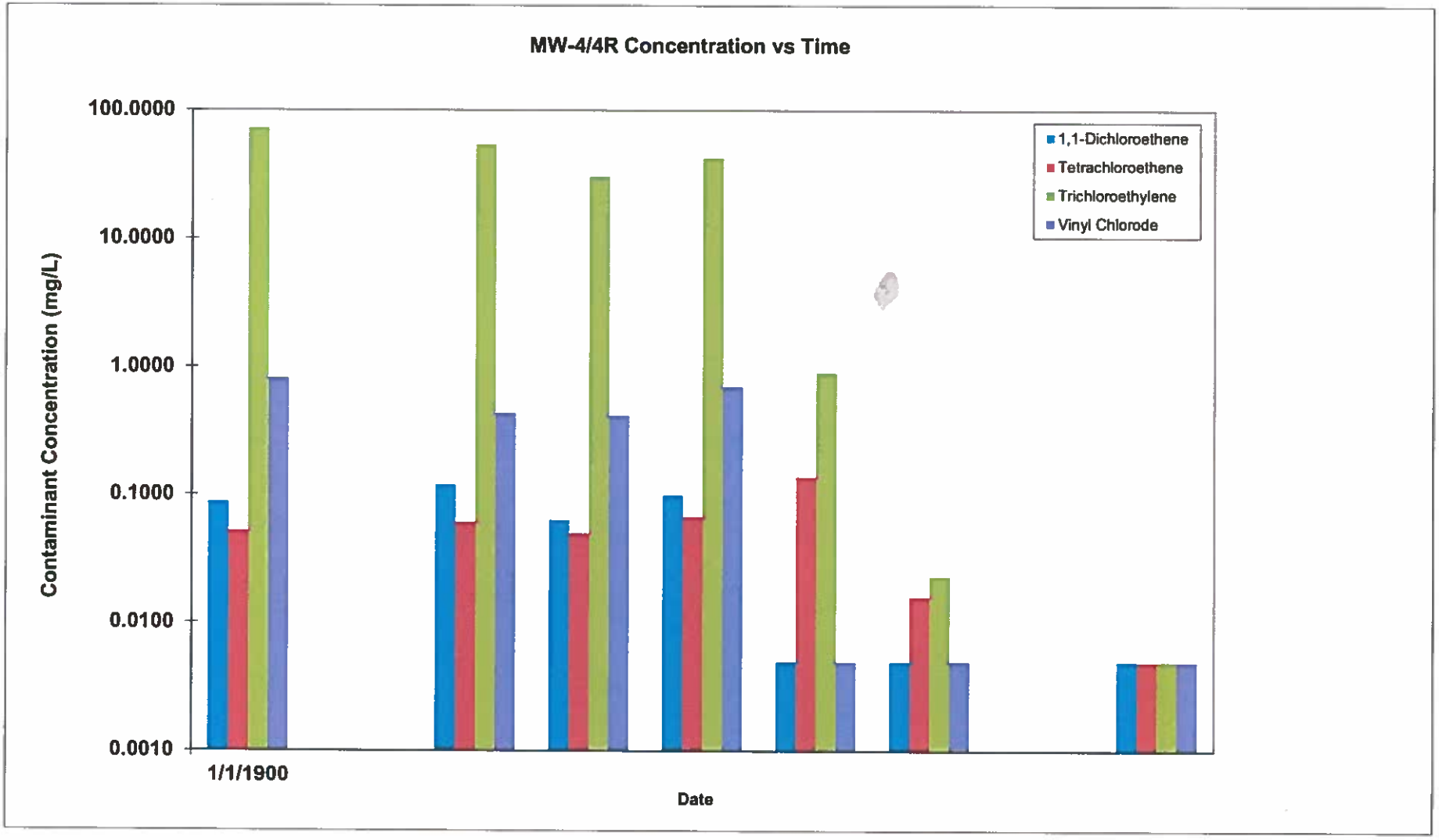


GOODWYN, MILLS CAWOOD, & INC.
ENGINEERING
ARCHITECTURE
LANDSCAPE ARCHITECTURE
PLANNING

Background sample at Sportsman Park

Drawn by James Robinson

ATTACHMENTS


MW-4/4R Concentration vs Time
100.0000
10.0000
1.0000
0.1000
0.0100
0.0010
Contaminant Concentration (mg/L)
1/1/1900
Date
1,1-Dichloroethene
Tetrachloroethene
Trichloroethylene
Vinyl Chlorode

Sutherland
Environmental Company, Inc.
2515 5th Avenue South
B'HAM, AL 35233
PHONE (205)581-9500 FAX (205)581-9504
E-Mail: suthlab@bellsouth.net

CHAIN OF CUSTODY ANALYSIS REQUEST

313606

SEND REPORT TO:
Name/Co.: Jymalyn Redmond
Address: 4659 Huffman Road Grady, AL 36036
Phone# / Cell#: 334-590-7010, 205-616-6116
E-mail: jymalyn.redmond@gmcnetwork.com, cory.trojano@gmcnetwork.com
PDF Results: yes no Fax #:

Client P.O. # EBHM131003

CLIENT: City of Cullman
PROJECT: Cullman Closure
SAMPLER(S): (print) Robinson, Redmond
DATE DELIVERED:

LAB ID	FIELD ID	DATE Collected	TIME Collected	SAMPLE DESCRIPTION (matrix)	METALS RCRA 8	METALS AS, Pb	VOCs	PAH					Number of sample containers
155801	PA2-S1A	9/24/14	13:15	SOIL	X		X						1
155802	PA2-S1B	9/24/14	13:20	SOIL	X		X						1
155803	PA2-S1D	9/24/14	13:15	SOIL	X								1
155804	PA2-S2A	9/24/14	13:30	SOIL	X		X						1
155805	PA2-S2B	9/24/14	13:35	SOIL	X		X						1
155806	PA2-S2D	9/24/14	13:20	SOIL			X						1
155807	PA2-S3A	9/24/14	13:40	SOIL	X		X						1
155808	PA2-S4A	9/24/14	13:50	SOIL	X		X						1
155809	PA2-S4B	9/24/14	13:55	SOIL	X		X						1
~~155810~~	~~PA3-S1~~	~~9/24/14~~	~~14:20~~	~~SOIL~~	X		X						1
~~155811~~	~~PA3-S2~~	~~9/24/14~~	~~14:27~~	~~SOIL~~	X		X						1
~~155812~~	~~PA3-S3~~	~~9/24/14~~	~~14:45~~	~~SOIL~~	X		X						1
Preservative: (a)HCL, (b)HNO_3, (c)H_2SO_4, (d)NaOH, (e)Zn Acetate				Preservative:	ICE								
Container type: (a) Amber, (g) Glass, (p) Plastic, (v) VOC Vial, (t) Tedlar bag				Container:	G								Last revised 8/6/08

ANALYSIS REQUESTED / METHOD

OMIT

Relinquished by Sampler: Signed:	Date	Time	Received by: Signed:	Date	Time
	9/25	2:20			
Relinquished by: Signed:	Date	Time	Received by: Signed:	Date	Time
Relinquished by: Signed:	Date	Time	Received in Laboratory by: Signed: Tasha McNeely	Date	Time
				9/25/14	0820

Turn Around Time (please note):
Standard *RUSH, mark below
*3-Day *2-Day *Next Day *Same Day
Remarks: 3 DAY RUSH ON PA2-S1A, PA2-S1B, PA2-S2A, PA2-S2B, MW-3, MW-6
25% mark-up
Page 1 of 2
Refrigerated upon receipt: (yes) no
Invoice # (LAB use only): 313606

313616

Sutherland
Environmental Company, Inc.
2515 5th Avenue South
B'HAM, AL 35233
PHONE (205)581-9500 FAX (205)581-9504
E-Mail: suthlab@bellsouth.net

CHAIN OF CUSTODY ANALYSIS REQUEST

SEND REPORT TO:
Name/Co.: Jymalyn Redmond
Address: 4659 Huffman Road Grady, AL 36036
Phone# / Cell#: 334-590-7010, 205-616-6116
E-mail: jymalyn.redmond@gmcnetwork.com, cory.troiano@gmcnetwork.com
PDF Results: yes no Fax #:

Client P.O. # EBHM131003

CLIENT: City of Cullman
PROJECT: Cullman Closure
SAMPLER(S): (print) Robinson, Redmond

DATE DELIVERED:

LAB ID	FIELD ID	DATE Collected	TIME Collected	SAMPLE DESCRIPTION (matrix)	METALS RCRA 8	METALS AS, Pb	VOCs	PAH					Number of sample containers
155813	CUL-SBG-1	9/24/14	11:00	SOIL	X		X	X					2
155814	PA3-S-1	9/24/14	14:20				X	X					1
155815	PA3-S-2	9/24/14	14:37				X	X					1
155816	PA3-S-3	9/24/14	14:45				X	X					1
155817	PA3-S-4	9/24/14	15:00				X	X					1
155818	PA3-S-5	9/24/14	15:06				X	X					1
155819	PA3-S-5D	9/24/14	15:10				X	X					1
155820	MW-3	9/25/14	9:15/14	WATER		X	X						4
155821	MW-6	9/25/14	10/05/14	WATER		X	X						4
155822	Trip Blank	—	—	↓			X						

Preservative: (a)HCL, (b)HNO_3, (c)H_2SO_4, (d)NaOH, (e)Zn Acetate **Preservative:** B ICE
Container type: (a) Amber, (g) Glass, (p) Plastic, (v) VOC Vial, (t) Tedlar bag **Container:** G

Last revised 8/6/08

Relinquished by Sampler: Signed:	Date	Time	Received by: Signed:	Date	Time
	9/25	2:20			
Relinquished by: Signed:	Date	Time	Received by: Signed:	Date	Time
Relinquished by: Signed:	Date	Time	Received in Laboratory by: Signed: Tasha McNeely	Date	Time
				9/25/14	220

Turn Around Time (please note):
Standard *RUSH, mark below
*3-Day *2-Day *Next Day *Same Day
3 Day Rush for MW-3, MW-6
25% mark-up
Page 2 of 2
Data faxed upon receipt: yes no
Invoice #: (LAB use only): 313616

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	9/27/14 - 10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID PA2-S1A LAB ID 155801	FIELD ID PA2-S1B LAB ID 155802	FIELD ID PA2-S2A LAB ID 155804	FIELD ID PA2-S2B LAB ID 155805	FIELD ID PA2-S2D LAB ID 155806	Practical Quantitation Limit PPM
Benzene	0.007	0.006	0.008	0.005	BDL	0.005
Bromobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Bromochloromethane	BDL	BDL	BDL	BDL	BDL	0.005
Bromodichloromethane	BDL	BDL	BDL	BDL	BDL	0.005
Bromoform	BDL	BDL	BDL	BDL	BDL	0.005
Bromomethane	BDL	BDL	BDL	BDL	BDL	0.005
n-Butylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
sec-Butylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
tert-Butybenzene	BDL	BDL	BDL	BDL	BDL	0.005
Carbon Tetrachloride	BDL	BDL	BDL	BDL	BDL	0.005
Chlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Chloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Chloroform	BDL	BDL	BDL	BDL	BDL	0.005
Chloromethane	BDL	BDL	BDL	BDL	BDL	0.005
2-Chlorotoluene	BDL	BDL	BDL	BDL	BDL	0.005
4-Chlorotoluene	BDL	BDL	BDL	BDL	BDL	0.005
Dibromochloromethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dibromo-3-Chloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dibromoethane	BDL	BDL	BDL	BDL	BDL	0.005
Dibromomethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Dichlorodifluoromethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1-Dichloroethane	BDL	0.016	BDL	BDL	BDL	0.005
1,2-Dichloroethane	BDL	BDL	BDL	BDL	BDL	0.005

Compound List Continued next page

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	9/27/14 - 10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID PA2-S1A LAB ID 155801	FIELD ID PA2-S1B LAB ID 155802	FIELD ID PA2-S2A LAB ID 155804	FIELD ID PA2-S2B LAB ID 155805	FIELD ID PA2-S2D LAB ID 155806	Practical Quantitation Limit PPM
1,1-Dichloroethene	BDL	0.012	BDL	BDL	BDL	0.005
cis-1,2-Dichloroethene	0.065	0.260	0.125	0.020	0.009	0.005
trans-1,2-Dichloroethene	BDL	0.006	BDL	BDL	BDL	0.005
1,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,3- Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
2,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,1-Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
cis-1-3,Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
Ethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Hexachlorobutadiene	BDL	BDL	BDL	BDL	BDL	0.005
Isopropylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
4-Isopropyltoluene	BDL	BDL	BDL	BDL	BDL	0.005
Methylene Chloride	0.453	0.238	0.242	0.420	BDL	0.100
Naphthalene	BDL	BDL	BDL	BDL	BDL	0.025
n-Propylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Styrene	BDL	BDL	BDL	BDL	BDL	0.005
1,1,1,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	0.005
Toluene	BDL	0.009	0.014	BDL	0.006	0.005
1,2,3-Trichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Trichloroethene	0.022	0.082	0.057	0.009	BDL	0.005
Trichlorofluoromethane	BDL	BDL	BDL	BDL	BDL	0.005

Compound List Continued next page

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	9/27/14 - 10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID / LAB ID 155801	FIELD ID / LAB ID 155802	FIELD ID / LAB ID 155804	FIELD ID / LAB ID 155805	FIELD ID / LAB ID 155806	Practical Quantitation Limit PPM
	PA2-S1A	PA2-S1B	PA2-S2A	PA2-S2B	PA2-S2D	
1,2,3-Trichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,2,4-Trimethylbenzene	BDL	BDL	0.005	BDL	BDL	0.005
1,3,5-Trimethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Vinyl Chloride	BDL	0.006	BDL	BDL	BDL	0.005
Xylenes, o,m,p	BDL	BDL	BDL	BDL	BDL	0.015
MTBE	BDL	BDL	BDL	BDL	BDL	0.005

Detection Limit is Practical Quantitation Limit
BDL = Below Detection Limit
All results expressed as PPM (mg/Kg)

ADEM # 41470
EPA Laboratory ID AL01084

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID PA2-S3A LAB ID 155807	FIELD ID PA2-S4A LAB ID 155808	FIELD ID PA2-S4B LAB ID 155809	FIELD ID CUL-SBG-1 LAB ID 155813	FIELD ID PA3-S-1 LAB ID 155814	Practical Quantitation Limit PPM
Benzene	BDL	BDL	BDL	BDL	**0.007**	0.005
Bromobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Bromochloromethane	BDL	BDL	BDL	BDL	BDL	0.005
Bromodichloromethane	BDL	BDL	BDL	BDL	BDL	0.005
Bromoform	BDL	BDL	BDL	BDL	BDL	0.005
Bromomethane	BDL	BDL	BDL	BDL	BDL	0.005
n-Butylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
sec-Butylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
tert-Butybenzene	BDL	BDL	BDL	BDL	BDL	0.005
Carbon Tetrachloride	BDL	BDL	BDL	BDL	BDL	0.005
Chlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Chloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Chloroform	BDL	BDL	BDL	BDL	BDL	0.005
Chloromethane	BDL	BDL	BDL	**0.007**	BDL	0.005
2-Chlorotoluene	BDL	BDL	BDL	BDL	BDL	0.005
4-Chlorotoluene	BDL	BDL	BDL	BDL	BDL	0.005
Dibromochloromethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dibromo-3-Chloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dibromoethane	BDL	BDL	BDL	BDL	BDL	0.005
Dibromomethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Dichlorodifluoromethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1-Dichloroethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dichloroethane	BDL	BDL	BDL	BDL	BDL	0.005

Compound List Continued next page

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID PA2-S3A LAB ID 155807	FIELD ID PA2-S4A LAB ID 155808	FIELD ID PA2-S4B LAB ID 155809	FIELD ID CUL-SBG-1 LAB ID 155813	FIELD ID PA3-S-1 LAB ID 155814	Practical Quantitation Limit PPM
1,1-Dichloroethene	BDL	BDL	BDL	BDL	BDL	0.005
cis-1,2-Dichloroethene	BDL	BDL	BDL	BDL	BDL	0.005
trans-1,2-Dichloroethene	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,3- Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
2,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,1-Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
cis-1-3,Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
Ethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Hexachlorobutadiene	BDL	BDL	BDL	BDL	BDL	0.005
Isopropylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
4-Isopropyltoluene	BDL	BDL	BDL	BDL	BDL	0.005
Methylene Chloride	BDL	BDL	**0.189**	**0.260**	**0.251**	0.100
Naphthalene	BDL	BDL	BDL	BDL	BDL	0.025
n-Propylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Styrene	BDL	BDL	BDL	BDL	BDL	0.005
1,1,1,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	0.005
Toluene	BDL	BDL	**0.005**	BDL	BDL	0.005
1,2,3-Trichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Trichloroethene	BDL	BDL	BDL	BDL	BDL	0.005
Trichlorofluoromethane	BDL	BDL	BDL	BDL	BDL	0.005

Compound List Continued next page

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID PA2-S3A LAB ID 155807	FIELD ID PA2-S4A LAB ID 155808	FIELD ID PA2-S4B LAB ID 155809	FIELD ID CUL-SBG-1 LAB ID 155813	FIELD ID PA3-S-1 LAB ID 155814	Practical Quantitation Limit PPM
1,2,3-Trichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,2,4-Trimethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,3,5-Trimethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Vinyl Chloride	BDL	BDL	BDL	BDL	BDL	0.005
Xylenes, o,m,p	BDL	BDL	BDL	BDL	BDL	0.015
MTBE	BDL	BDL	BDL	BDL	BDL	0.005

Detection Limit is Practical Quantitation Limit
BDL = Below Detection Limit
All results expressed as PPM (mg/Kg)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID PA3-S-2 LAB ID 155815	FIELD ID PA3-S-3 LAB ID 155816	FIELD ID PA3-S-4 LAB ID 155817	FIELD ID PA3-S-5 LAB ID 155818		Practical Quantitation Limit PPM
Benzene	0.005	0.006	BDL	0.006		0.005
Bromobenzene	BDL	BDL	BDL	BDL		0.005
Bromochloromethane	BDL	BDL	BDL	BDL		0.005
Bromodichloromethane	BDL	BDL	BDL	BDL		0.005
Bromoform	BDL	BDL	BDL	BDL		0.005
Bromomethane	BDL	BDL	BDL	BDL		0.005
n-Butylbenzene	BDL	BDL	BDL	BDL		0.005
sec-Butylbenzene	BDL	BDL	BDL	BDL		0.005
tert-Butybenzene	BDL	BDL	BDL	BDL		0.005
Carbon Tetrachloride	BDL	BDL	BDL	BDL		0.005
Chlorobenzene	BDL	BDL	BDL	BDL		0.005
Chloroethane	BDL	BDL	BDL	BDL		0.005
Chloroform	BDL	BDL	BDL	BDL		0.005
Chloromethane	BDL	BDL	BDL	BDL		0.005
2-Chlorotoluene	BDL	BDL	BDL	BDL		0.005
4-Chlorotoluene	BDL	BDL	BDL	BDL		0.005
Dibromochloromethane	BDL	BDL	BDL	BDL		0.005
1,2-Dibromo-3-Chloropropane	BDL	BDL	BDL	BDL		0.005
1,2-Dibromoethane	BDL	BDL	BDL	BDL		0.005
Dibromomethane	BDL	BDL	BDL	BDL		0.005
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL		0.005
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL		0.005
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL		0.005
Dichlorodifluoromethane	BDL	BDL	BDL	BDL		0.005
1,1-Dichloroethane	BDL	BDL	BDL	BDL		0.005
1,2-Dichloroethane	BDL	BDL	BDL	BDL		0.005

Compound List Continued next page

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID PA3-S-2 LAB ID 155815	FIELD ID PA3-S-3 LAB ID 155816	FIELD ID PA3-S-4 LAB ID 155817	FIELD ID PA3-S-5 LAB ID 155818		Practical Quantitation Limit PPM
1,1-Dichloroethene	BDL	BDL	BDL	BDL		0.005
cis-1,2-Dichloroethene	BDL	BDL	BDL	BDL		0.005
trans-1,2-Dichloroethene	BDL	BDL	BDL	BDL		0.005
1,2-Dichloropropane	BDL	BDL	BDL	BDL		0.005
1,3- Dichloropropane	BDL	BDL	BDL	BDL		0.005
2,2-Dichloropropane	BDL	BDL	BDL	BDL		0.005
1,1-Dichloropropene	BDL	BDL	BDL	BDL		0.005
cis-1-3,Dichloropropene	BDL	BDL	BDL	BDL		0.005
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL		0.005
Ethylbenzene	BDL	BDL	BDL	BDL		0.005
Hexachlorobutadiene	BDL	BDL	BDL	BDL		0.005
Isopropylbenzene	BDL	BDL	BDL	BDL		0.005
4-Isopropyltoluene	BDL	BDL	BDL	BDL		0.005
Methylene Chloride	0.284	0.243	0.139	0.209		0.100
Naphthalene	BDL	BDL	BDL	BDL		0.025
n-Propylbenzene	BDL	BDL	BDL	BDL		0.005
Styrene	BDL	BDL	BDL	BDL		0.005
1,1,1,2-Tetrachloroethane	BDL	BDL	BDL	BDL		0.005
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL		0.005
Tetrachloroethene	BDL	BDL	BDL	BDL		0.005
Toluene	BDL	BDL	BDL	BDL		0.005
1,2,3-Trichlorobenzene	BDL	BDL	BDL	BDL		0.005
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL		0.005
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL		0.005
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL		0.005
Trichloroethene	BDL	BDL	BDL	BDL		0.005
Trichlorofluoromethane	BDL	BDL	BDL	BDL		0.005

Compound List Continued next page

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/24/14	Date of Analysis:	10/1/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260B***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID / LAB ID	FIELD ID / LAB ID	FIELD ID / LAB ID	FIELD ID / LAB ID		Practical Quantitation Limit PPM
	PA3-S-2 / 155815	PA3-S-3 / 155816	PA3-S-4 / 155817	PA3-S-5 / 155818		
1,2,3-Trichloropropane	BDL	BDL	BDL	BDL		0.005
1,2,4-Trimethylbenzene	BDL	BDL	BDL	BDL		0.005
I,3,5-Trimethylbenzene	BDL	BDL	BDL	BDL		0.005
Vinyl Chloride	BDL	BDL	BDL	BDL		0.005
Xylenes, o,m,p	BDL	BDL	BDL	BDL		0.015
MTBE	BDL	BDL	BDL	BDL		0.005

Detection Limit is Practical Quantitation Limit
BDL = Below Detection Limit
All results expressed as PPM (mg/Kg)

MH / QAQC

ADEM # 41470
EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety

Kevin Doriety
Analytical Chemist

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	September 30, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/25/14	Date Analysis:	9/27-29/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID MW-3 LAB ID 155820	FIELD ID MW-6 LAB ID 155821	FIELD ID TripBlank LAB ID 155822				Detection Limit PPM
Benzene	BDL	BDL	BDL				0.005
Bromobenzene	BDL	BDL	BDL				0.005
Bromochloromethane	BDL	BDL	BDL				0.005
Bromodichloromethane	BDL	BDL	BDL				0.005
Bromoform	BDL	BDL	BDL				0.005
Bromomethane	BDL	BDL	BDL				0.005
n-Butylbenzene	BDL	BDL	BDL				0.005
sec-Butylbenzene	BDL	BDL	BDL				0.005
tert-Butybenzene	BDL	BDL	BDL				0.005
Carbon Tetrachloride	BDL	BDL	BDL				0.005
Chlorobenzene	BDL	BDL	BDL				0.005
Chloroethane	BDL	BDL	BDL				0.005
Chloroform	BDL	BDL	BDL				0.005
Chloromethane	BDL	**0.084**	BDL				0.005
2-Chlorotoluene	BDL	BDL	BDL				0.005
4-Chlorotoluene	BDL	BDL	BDL				0.005
Dibromochloromethane	BDL	BDL	BDL				0.005
1,2-Dibromo-3-Chloropropane	BDL	BDL	BDL				0.005
1,2-Dibromoethane	BDL	BDL	BDL				0.005
Dibromomethane	BDL	BDL	BDL				0.005
1,2-Dichlorobenzene	BDL	BDL	BDL				0.005
1,3-Dichlorobenzene	BDL	BDL	BDL				0.005
1,4-Dichlorobenzene	BDL	BDL	BDL				0.005
Dichlorodifluoromethane	BDL	BDL	BDL				0.005
1,1-Dichloroethane	**0.832**	BDL	BDL				0.005
1,2-Dichloroethane	BDL	**0.006**	BDL				0.005

Compound List Continued next page

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	September 30, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/25/14	Date Analysis:	9/27-29/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID MW-3 LAB ID 155820	FIELD ID MW-6 LAB ID 155821	FIELD ID TripBlank LAB ID 155822			Detection Limit PPM
1,1-Dichloroethene	6.080	BDL	BDL			0.005
cis-1,2-Dichloroethene	1.840	1.290	BDL			0.005
trans-1,2-Dichloroethene	0.044	0.156	BDL			0.005
1,2-Dichloropropane	BDL	BDL	BDL			0.005
1,3- Dichloropropane	BDL	BDL	BDL			0.005
2,2-Dichloropropane	BDL	BDL	BDL			0.005
1,1-Dichloropropene	BDL	BDL	BDL			0.005
cis-1-3,Dichloropropene	BDL	BDL	BDL			0.005
trans-1,3-Dichloropropene	BDL	BDL	BDL			0.005
Ethylbenzene	BDL	BDL	BDL			0.005
Hexachlorobutadiene	BDL	BDL	BDL			0.005
Isopropylbenzene	BDL	BDL	BDL			0.005
4-Isopropyltoluene	BDL	BDL	BDL			0.005
Methylene Chloride	0.008	0.020	BDL			0.005
Naphthalene	BDL	BDL	BDL			0.010
n-Propylbenzene	BDL	BDL	BDL			0.005
Styrene	BDL	BDL	BDL			0.005
1,1,1,2-Tetrachloroethane	BDL	BDL	BDL			0.005
1,1,2,2-Tetrachloroethane	0.016	BDL	BDL			0.005
Tetrachloroethene	0.072	BDL	BDL			0.005
Toluene	0.033	BDL	BDL			0.005
1,2,3-Trichlorobenzene	BDL	BDL	BDL			0.005
1,2,4-Trichlorobenzene	BDL	BDL	BDL			0.005
1,1,1-Trichloroethane	0.722	BDL	BDL			0.005
1,1,2-Trichloroethane	0.024	0.013	BDL			0.005

Compound List Continued next page

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	September 30, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/25/14	Analyst:	Hageman/Heard
Date Collected:	9/25/14	Date Analysis:	9/27-29/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID MW-3 LAB ID 155820	FIELD ID MW-6 LAB ID 155821	FIELD ID TripBlank LAB ID 155822			Detection Limit PPM
Trichloroethylene	30.000	0.096	BDL			0.005
Trichlorofluoromethane	BDL	BDL	BDL			0.005
1,2,3-Trichloropropane	BDL	BDL	BDL			0.005
1,2,4-Trimethylbenzene	BDL	BDL	BDL			0.005
1,3,5-Trimethylbenzene	BDL	BDL	BDL			0.005
Vinyl Chloride	0.424	0.028	BDL			0.002
Xylenes, o,m,p	BDL	BDL	BDL			0.005
MTBE	BDL	BDL	BDL			0.005

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

MH/QAQC

EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety
Analytical Chemist

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Extraction Date:	9/29/14
Date Received:	9/25/14	Analyst:	Hageman/Currence
Date Collected:	9/24/14	Date of Analysis:	9/30/14
Sample Collector:	Robinson/ Redmond	Method:	*EPA Method 8270C*

POLYNUCLEAR AROMATIC HYDROCARBONS

Polynuclear Aromatics, ppm	FIELD ID CUL-SBG-1 LAB ID 155813	FIELD ID PA3-S-1 LAB ID 155814	FIELD ID PA3-S-2 LAB ID 155815	FIELD ID PA3-S-3 LAB ID 155816	FIELD ID PA3-S-4 LAB ID 155817	FIELD ID PA3-S-5 LAB ID 155818	Detection Limit, ppm
Acenaphthene	BDL	BDL	BDL	BDL	BDL	0.064	0.050
Acenaphthylene	BDL	BDL	BDL	BDL	0.238	BDL	0.050
Anthracene	BDL	BDL	BDL	0.067	0.469	0.182	0.050
Benzo(a)anthracene	BDL	BDL	BDL	0.263	0.835	0.485	0.050
Benzo(b)fluoranthene	BDL	BDL	0.053	0.496	2.840	0.775	0.050
Benzo(k)fluoranthene	BDL	BDL	BDL	0.335	1.840	0.550	0.050
Benzo(ghi)perylene	BDL	BDL	BDL	0.341	0.895	0.500	0.050
Benzo(a)pyrene	BDL	BDL	0.067	0.468	1.170	0.720	0.050
Chrysene	BDL	BDL	0.068	0.362	3.070	0.625	0.050
Dibenzo(ah)anthracene	BDL	BDL	BDL	0.116	0.212	0.108	0.050
Fluoranthene	BDL	BDL	0.059	0.443	3.170	0.965	0.050
Fluorene	BDL	BDL	BDL	BDL	0.085	0.060	0.050
Indeno(1,2,3-cd)pyrene	BDL	BDL	BDL	0.286	0.820	0.440	0.050
Naphthalene	BDL	BDL	0.113	BDL	0.076	BDL	0.050
Phenanthrene	BDL	BDL	0.163	0.200	0.830	0.575	0.050
Pyrene	BDL	BDL	0.053	0.352	2.590	0.740	0.050

BDL = Below Detection Limit
Detection limit is Practical Quantitation Limit
All results expressed as PPM (mg/kg)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 1, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Extraction Date:	9/29/14
Date Received:	9/25/14	Analyst:	Hageman/Currence
Date Collected:	9/24/14	Date of Analysis:	9/30/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 8270C***

POLYNUCLEAR AROMATIC HYDROCARBONS

	FIELD ID						
	PA3-S-5D						
Polynuclear Aromatics, ppm	LAB ID						Detection Limit, ppm
	155819						
Acenaphthene	0.057						0.050
Acenaphthylene	BDL						0.050
Anthracene	0.520						0.050
Benzo(a)anthracene	4.700						0.050
Benzo(b)fluoranthene	6.100						0.050
Benzo(k)fluoranthene	4.580						0.050
Benzo(ghi)perylene	3.180						0.050
Benzo(a)pyrene	5.450						0.050
Chrysene	5.100						0.050
Dibenzo(ah)anthracene	0.805						0.050
Fluoranthene	6.250						0.050
Fluorene	0.074						0.050
Indeno(1,2,3-cd)pyrene	2.860						0.050
Naphthalene	BDL						0.050
Phenanthrene	1.750						0.050
Pyrene	5.050						0.050

BDL = Below Detection Limit
Detection limit is Practical Quantitation Limit
All results expressed as PPM (mg/kg)

MH / QAQC

EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety

Kevin Doriety
Analytical Chemist

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	September 30, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Kevin Doriety
Date Collected:	9/24/14	Date of Analysis:	9/30/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 6010B/ Hg: 7471A***

METALLIC ANALYTES

Analyte, mg/Kg as Total	FIELD ID PA2-S1A LAB ID 155801	FIELD ID PA2-S1B LAB ID 155802	FIELD ID PA2-S2A LAB ID 155804	FIELD ID PA2-S2B LAB ID 155805			Detection Limit,mg/Kg
Arsenic	7.2	2.0	6.3	BDL			1.0
Barium	16	15	16	18			1.0
Cadmium	BDL	BDL	BDL	BDL			1.0
Chromium	23	24	35	29			1.0
Lead	12	14	14	11			1.0
Mercury	BDL	BDL	BDL	BDL			0.01
Selenium	BDL	BDL	BDL	BDL			1.0
Silver	BDL	BDL	BDL	BDL			1.0

BDL = Below Detection Limit
Detection Limit is Reporting Limit
All results expressed as PPM mg/Kg of total analyte

EPA Laboratory ID AL01084

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	September 30, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	soil	Analytical	
Date Received:	9/25/14	Analyst:	Kevin Doriety
Date Collected:	9/24/14	Date of Analysis:	9/30/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 6010B/ Hg: 7471A***

METALLIC ANALYTES

Analyte, mg/Kg as Total	FIELD ID PA2-S1D / LAB ID 155803	FIELD ID PA2-S3A / LAB ID 155807	FIELD ID PA2-S4A / LAB ID 155808	FIELD ID PA2-S4B / LAB ID 155809	FIELD ID CUL-SBG-1 / LAB ID 155813		Detection Limit,mg/Kg
Arsenic	2.8	4.4	3.3	2.3	5.6		1.0
Barium	14	23	62	19	61		1.0
Cadmium	BDL	BDL	BDL	BDL	BDL		1.0
Chromium	21	17	15	20	36		1.0
Lead	9.9	46	83	11	66		1.0
Mercury	BDL	BDL	BDL	BDL	BDL		0.01
Selenium	BDL	BDL	BDL	BDL	BDL		1.0
Silver	BDL	BDL	BDL	BDL	BDL		1.0

BDL = Below Detection Limit
Detection Limit is Reporting Limit
All results expressed as PPM mg/Kg of total analyte

MH / QAQC

EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety
Analytical Chemist

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	September 30, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31366
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/25/14	Analyst:	Kevin Doriety
Date Collected:	9/25/14	Date Analysis:	9/30/14
Sample Collector:	Robinson/ Redmond	Method:	***EPA Method 6010B***

METALLIC ANALYTES

	FIELD ID	FIELD ID					
	MW-3	MW-6					
Analyte, mg/L as Total	LAB ID	LAB ID					Detection Limit,mg/L
	155820	155821					
Arsenic	BDL	BDL					0.010
Lead	0.12	0.066					0.0020

BDL = Below Detection Limit
Detection Limit is Method Detection Limit
All results expressed as PPM mg/L of total analyte

MH / QAQC

EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety
Analytical Chemist

Sutherland
Environmental Company, Inc.
2515 5th Avenue South
B'HAM, AL 35233
PHONE (205)581-9500 FAX (205)581-9504
E-Mail: suthlab@bellsouth.net

CHAIN OF CUSTODY ANALYSIS REQUEST

31373

SEND REPORT TO:
Name/Co.: Jymalyn Redmond
Address: 4659 Huffman Road Grady, AL 36036
Phone# / Cell#: 334-590-7010, 205-616-6116
E-mail: jymalyn.redmond@gmcnetwork.com, cory.troiano@gmcnetwork.com
PDF Results: yes no Fax #:

Client P.O. # EBHM131003

CLIENT: City of Cullman
PROJECT: Cullman Closure
SAMPLER(S): (print) Redmond, Troiano, Edwards

DATE DELIVERED:

LAB ID	FIELD ID	DATE Collected	TIME Collected	SAMPLE DESCRIPTION (matrix)	METALS RCRA 8	METALS AS, Pb	VOCs	PAH					Number of sample containers
					ANALYSIS REQUESTED / METHOD								
155846	MW 1	9/25/14	10:21	groundwater		X	X						4
155847	MW 2	9/25/14	10:41	groundwater		X	X						4
155848	MW 4R	9/25/14	11:01	groundwater		X	X						4
155849	MW 9	9/25/14	11:25	groundwater		X	X						4
155850	MW 10	9/25/14	11:35	groundwater		X	X						4
155851	Trip Blank	—	—				X						

Preservative: (a)HCL, (b)HNO_3, (c)H_2SO_4, (d)NaOH, (e)Zn Acetate **Preservative:** ICE
Container type: (a) Amber, (g) Glass, (p) Plastic, (v) VOC Vial, (t) Tedlar bag **Container:** G

Last revised 8/6/08

Relinquished by Sampler:	Date	Time	Received by:	Date	Time
Signed: Jymalyn Redmond	9/26	11:30	Signed:		
Relinquished by:	Date	Time	Received by:	Date	Time
Signed:			Signed:		
Relinquished by:	Date	Time	Received in Laboratory by:	Date	Time
Signed:			Signed: Tasha McNeely	9/26/14	1130

Turn Around Time (please note):
Standard ✓ *RUSH, mark below
*3-Day *2-Day *Next Day *Same Day

Refrigerated upon receipt: (yes) no
Invoice # (LAB use only): 31373

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 3, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31373
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/26/14	Analyst:	Hageman/Heard
Date Collected:	9/25/14	Date Analysis:	10/2/14
Sample Collector:	Redmond/ Troiano Edwards	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID MW-1 LAB ID 155846	FIELD ID MW-2 LAB ID 155847	FIELD ID MW-4R LAB ID 155848	FIELD ID MW-9 LAB ID 155849	FIELD ID MW-10 LAB ID 155850	Detection Limit PPM
Benzene	BDL	BDL	BDL	BDL	BDL	0.005
Bromobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Bromochloromethane	BDL	BDL	BDL	BDL	BDL	0.005
Bromodichloromethane	BDL	BDL	BDL	BDL	BDL	0.005
Bromoform	BDL	BDL	BDL	BDL	BDL	0.005
Bromomethane	BDL	BDL	BDL	BDL	BDL	0.005
n-Butylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
sec-Butylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
tert-Butybenzene	BDL	BDL	BDL	BDL	BDL	0.005
Carbon Tetrachloride	BDL	BDL	BDL	BDL	BDL	0.005
Chlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Chloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Chloroform	BDL	BDL	BDL	BDL	BDL	0.005
Chloromethane	BDL	BDL	BDL	BDL	BDL	0.005
2-Chlorotoluene	BDL	BDL	BDL	BDL	BDL	0.005
4-Chlorotoluene	BDL	BDL	BDL	BDL	BDL	0.005
Dibromochloromethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dibromo-3-Chloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dibromoethane	BDL	BDL	BDL	BDL	BDL	0.005
Dibromomethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL	0.007	0.005
1,3-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
Dichlorodifluoromethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1-Dichloroethane	0.011	BDL	BDL	BDL	0.007	0.005
1,2-Dichloroethane	BDL	BDL	BDL	BDL	BDL	0.005

Compound List Continued next page

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 3, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31373
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/26/14	Analyst:	Hageman/Heard
Date Collected:	9/25/14	Date Analysis:	10/2/14
Sample Collector:	Redmond/ Troiano Edwards	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID MW-1 LAB ID 155846	FIELD ID MW-2 LAB ID 155847	FIELD ID MW-4R LAB ID 155848	FIELD ID MW-9 LAB ID 155849	FIELD ID MW-10 LAB ID 155850	Detection Limit PPM
1,1-Dichloroethene	**0.005**	BDL	BDL	BDL	**0.048**	0.005
cis-1,2-Dichloroethene	**0.078**	**0.025**	BDL	**0.292**	**0.366**	0.005
trans-1,2-Dichloroethene	BDL	BDL	BDL	BDL	**0.006**	0.005
1,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,3- Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
2,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,1-Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
cis-1-3,Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
trans-1,3-Dichloropropene	BDL	BDL	BDL	BDL	BDL	0.005
Ethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Hexachlorobutadiene	BDL	BDL	BDL	BDL	BDL	0.005
Isopropylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
4-Isopropyltoluene	BDL	BDL	BDL	BDL	BDL	0.005
Methylene Chloride	BDL	BDL	BDL	BDL	BDL	0.010
Naphthalene	BDL	BDL	BDL	BDL	BDL	0.010
n-Propylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Styrene	BDL	BDL	BDL	BDL	BDL	0.005
1,1,1,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	0.005
Tetrachloroethene	BDL	BDL	BDL	BDL	**0.039**	0.005
Toluene	BDL	BDL	BDL	BDL	BDL	0.005
1,2,3-Trichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,2,4-Trichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	0.005
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL	BDL	0.005

Compound List Continued next page

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 3, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31373
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/26/14	Analyst:	Hageman/Heard
Date Collected:	9/25/14	Date Analysis:	10/2/14
Sample Collector:	Redmond/ Troiano Edwards	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID MW-1 LAB ID 155846	FIELD ID MW-2 LAB ID 155847	FIELD ID MW-4R LAB ID 155848	FIELD ID MW-9 LAB ID 155849	FIELD ID MW-10 LAB ID 155850	Detection Limit PPM
Trichloroethylene	0.067	BDL	BDL	0.229	2.510	0.005
Trichlorofluoromethane	BDL	BDL	BDL	BDL	BDL	0.005
1,2,3-Trichloropropane	BDL	BDL	BDL	BDL	BDL	0.005
1,2,4-Trimethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
1,3,5-Trimethylbenzene	BDL	BDL	BDL	BDL	BDL	0.005
Vinyl Chloride	BDL	0.006	BDL	0.033	0.006	0.002
Xylenes, o,m,p	BDL	BDL	BDL	BDL	BDL	0.005
MTBE	BDL	BDL	BDL	BDL	BDL	0.005

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 3, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31373
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/26/14	Analyst:	Hageman/Heard
Date Collected:	N/A	Date Analysis:	10/2/14
Sample Collector:	Redmond/ Troiano Edwards	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID: TripBlank LAB ID: 155851	Detection Limit PPM
Benzene	BDL	0.005
Bromobenzene	BDL	0.005
Bromochloromethane	BDL	0.005
Bromodichloromethane	BDL	0.005
Bromoform	BDL	0.005
Bromomethane	BDL	0.005
n-Butylbenzene	BDL	0.005
sec-Butylbenzene	BDL	0.005
tert-Butybenzene	BDL	0.005
Carbon Tetrachloride	BDL	0.005
Chlorobenzene	BDL	0.005
Chloroethane	BDL	0.005
Chloroform	BDL	0.005
Chloromethane	BDL	0.005
2-Chlorotoluene	BDL	0.005
4-Chlorotoluene	BDL	0.005
Dibromochloromethane	BDL	0.005
1,2-Dibromo-3-Chloropropane	BDL	0.005
1,2-Dibromoethane	BDL	0.005
Dibromomethane	BDL	0.005
1,2-Dichlorobenzene	BDL	0.005
1,3-Dichlorobenzene	BDL	0.005
1,4-Dichlorobenzene	BDL	0.005
Dichlorodifluoromethane	BDL	0.005
1,1-Dichloroethane	BDL	0.005
1,2-Dichloroethane	BDL	0.005

Compound List Continued next page

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 3, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31373
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/26/14	Analyst:	Hageman/Heard
Date Collected:	N/A	Date Analysis:	10/2/14
Sample Collector:	Redmond/ Troiano Edwards	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS, PPM	FIELD ID: TripBlank LAB ID: 155851	Detection Limit PPM
1,1-Dichloroethene	BDL	0.005
cis-1,2-Dichloroethene	BDL	0.005
trans-1,2-Dichloroethene	BDL	0.005
1,2-Dichloropropane	BDL	0.005
1,3- Dichloropropane	BDL	0.005
2,2-Dichloropropane	BDL	0.005
1,1-Dichloropropene	BDL	0.005
cis-1-3,Dichloropropene	BDL	0.005
trans-1,3-Dichloropropene	BDL	0.005
Ethylbenzene	BDL	0.005
Hexachlorobutadiene	BDL	0.005
Isopropylbenzene	BDL	0.005
4-Isopropyltoluene	BDL	0.005
Methylene Chloride	BDL	0.010
Naphthalene	BDL	0.010
n-Propylbenzene	BDL	0.005
Styrene	BDL	0.005
1,1,1,2-Tetrachloroethane	BDL	0.005
1,1,2,2-Tetrachloroethane	BDL	0.005
Tetrachloroethene	BDL	0.005
Toluene	BDL	0.005
1,2,3-Trichlorobenzene	BDL	0.005
1,2,4-Trichlorobenzene	BDL	0.005
1,1,1-Trichloroethane	BDL	0.005
1,1,2-Trichloroethane	BDL	0.005

Compound List Continued next page

BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 3, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31373
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/26/14	Analyst:	Hageman/Heard
Date Collected:	N/A	Date Analysis:	10/2/14
Sample Collector:	Redmond/ Troiano Edwards	Method:	***EPA Method 8260***

VOLATILE ORGANIC COMPOUNDS

	FIELD ID					
VOLATILE ORGANIC COMPOUNDS, PPM	TripBlank					Detection Limit PPM
	LAB ID					
	155851					
Trichloroethylene	BDL					0.005
Trichlorofluoromethane	BDL					0.005
1,2,3-Trichloropropane	BDL					0.005
1,2,4-Trimethylbenzene	BDL					0.005
1,3,5-Trimethylbenzene	BDL					0.005
Vinyl Chloride	BDL					0.002
Xylenes, o,m,p	BDL					0.005
MTBE	BDL					0.005

NA = Not Available
BDL = Below Detection Limit, Method
All results expressed as PPM (mg/L)

MH/QAQC

EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety
Analytical Chemist

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500

Client:	Goodwyn, Mills & Cawood	Report Date:	October 3, 2014
Attention:	Ms. Jymalyn Redmond	Reference #	31373
Address:	4659 Huffman Rd.	P.O. #	EBHM131003
	Grady, AL 36036	Project ID:	Cullman Closure

Sample Matrix:	water	Analytical	
Date Received:	9/26/14	Analyst:	Kevin Doriety
Date Collected:	9/25/14	Date Analysis:	9/30/14
Sample Collector:	Redmond/ Troiano Edwards	Method:	***EPA Method 6010B***

METALLIC ANALYTES

	FIELD ID	FIELD ID	FIELD ID	FIELD ID	FIELD ID		
	MW-1	MW-2	MW-4R	MW-9	MW-10		
Analyte, mg/L as Total	LAB ID	LAB ID	LAB ID	LAB ID	LAB ID		Detection Limit,mg/L
	155846	155847	155848	155849	155850		
Arsenic	BDL	BDL	BDL	BDL	BDL		0.010
Lead	0.037	0.043	0.024	BDL	BDL		0.0020

BDL = Below Detection Limit
Detection Limit is Method Detection Limit
All results expressed as PPM mg/L of total analyte

MH / QAQC

EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety

Kevin Doriety
Analytical Chemist

Brownfield Cleanup for EPA Region 4 Grant Activities

Cleanup Action Activities for Grief Facility, Cullman, Alabama

Confirmatory QAPP
Quality Assurance Project Plan

Revision 4

Prepared for:

THE CITY OF CULLMAN

and

ENVIRONMENTAL PROTECTION AGENCY REGION 4
BROWNFIELDS PROGRAM
ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Goodwyn, Mills, and Cawood
2660 East Chase Lane
Montgomery, Alabama 36117
Jymalyn Redmond, Project Manager

A PROJECT MANAGEMENT

A1. Approval Sheet

Jymalyn Redmond — Date 9/16/14
Goodwyn, Mills and Cawood, Inc.
Environmental Project Manager

James Robinson — Date
Goodwyn, Mills and Cawood, Inc.
Quality Assurance Officer

Wanda Jennings — Date 09/15/14
Region 4 Environmental Protection Agency
Reviewing Manager

Larry Norris — Date
Chief Redevelopment Section
Land Division
Alabama Department of Environmental Management